

Visualization is not a Camel



Courtesy of Ron Kikinis,
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“With a little help from my friends...”

Lisa Avila-Sobierajski, Kitware

John Clyne, NCAR

Michael Halle, Surgical Planning Lab, B&W Hospital

Kevin Kreeger, Viatronix

Barthold Lichtenbelt, 3DLabs

Andy Vesper, TeraRecon

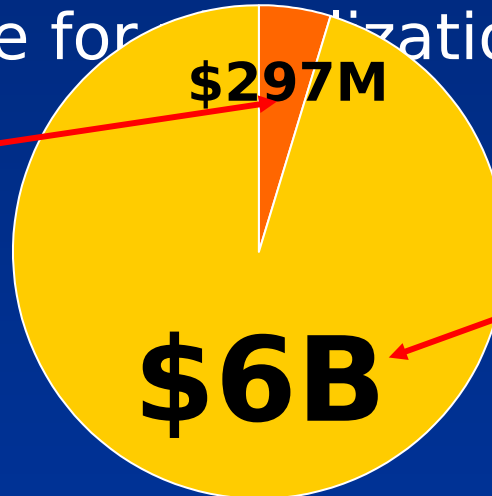
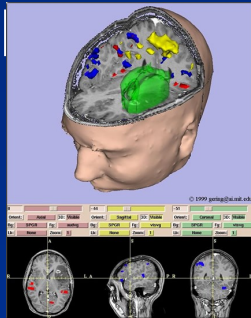
Ruediger Westerman, University of Aachen

All opinions expressed in this talk are of course my own!

Especially if you have a problem with them...

Trends

- Games drive the pace of graphics innovation on the PC.
 - New commodity hardware every 6 months.
 - New DirectX API every 12 months.
- Graphics and visualization applications must run on PCs to be commercially viable.
- Games directly influence what graphics hardware and AI use for visualization.



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SIGGRAPH 2001 panel

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The Good, the bad & the ugly

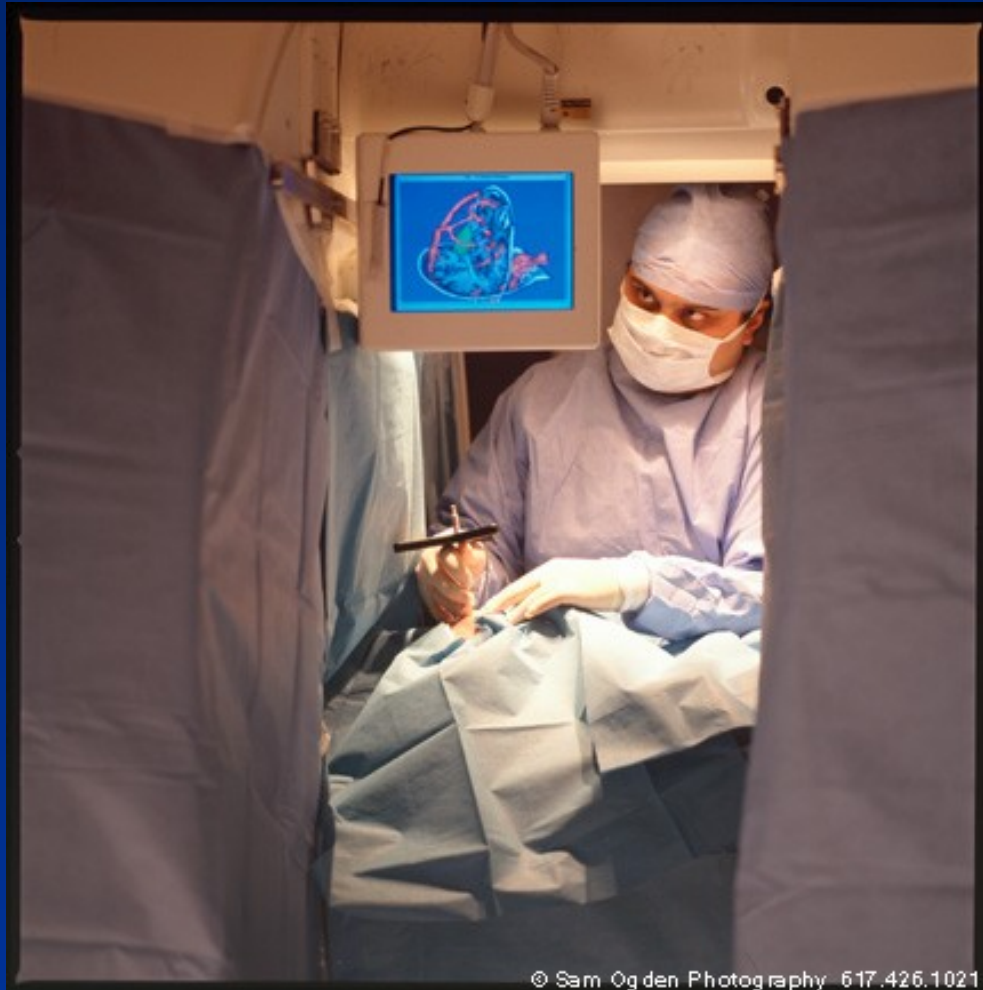
- Thanks to games, we are getting some really good and very cheap graphics hardware.
- More programmability in the graphics pipe:
 - Vertex shaders, pixel shaders, multipass rendering.
- The visualization community is starting to do some cool stuff with this.
 - "High-Quality Pre-Integrated Volume Rendering Using Hardware-Accelerated Pixel Shading", K. Engel et al., Graphics Hardware 2001.
 - "Volumetric Deformation on General Purpose Hardware", C. Rezk-Salama et al., Graphics Hardware 2001.

The Good, **the bad** & the ugly

- Commodity graphics cards have:
 - Missing or broken features.
 - High precision graphics pipe and framebuffer, overlay planes, texture border support, 3D texture mapping in hardware, pixel read/write operations, hardware accumulation buffers, support for stereo, multiple synchronized graphics pipes, multiple video formats, support for many graphics contexts, high-quality AA lines, indexed color in HW, streaming texture support (for video), hardware picking, large textures (> 512x512), deep pixels, etc.
 - Drivers tuned for Quake.
 - Severe image quality issues.
 - Unstable drivers.

The Good, **the bad** & the ugly

- Mind the “blue screen of death”...



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The Good, the bad & the ugly

- APIs are driven by the needs of the game community.
- Game programmers have a very short event horizon.
 - They don't worry about the long term consequences of new API features.
 - Shaders = assembly programming (@#%\$#!)
- Sound API principles are replaced with “extensions” or “capabilities”.
 - OpenGL extensions are badly broken.
 - Who can keep up with D3D?
- Professional APIs (i.e., OpenGL) are in danger of commercial obsolescence.
 - D3D / Xbox vs. OpenGL / Quake

Here's the deal...

- Games and game programmers screw up our graphics hardware and APIs.
- The requirements for visualization are not met:
 - Image quality.
 - Scalability and stability.
 - Cross-platform availability of features.
 - A professional API built on sound principles.
- How do we change this?
 - Beg John Carmack to use 64-bit pixels, multiple graphics contexts, and 3D textures in Quake IV!